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ABSTRACT

Research which resulted in the development of the United States Employment Service Specific Aptitude Test Battery for use in selecting inexperienced or untrained individuals for training as proof-machine operators is described. Occupational norms were established in terms of each significant aptitude measure which when combined, predict job performance. Statistical data, names of organizations cooperating in the study, a descriptive rating scale, and a description of the job duties of the proof-machine-operator (banking) are included. (BJG)

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Proof-Machine Operator (banking) 217.388

U.S. Department of Labor
Employment and Training Administration
U.S. Employment Service
Technical Report S-217R75
1975

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S-217R75

S-217R75

Technical Report on Development of USES Specific Aptitude Test Battery

For

Proof-Machine Operator (banking) 217.388

S-217R75

Developed in Cooperation with the
Arizona, Arkansas, California, Colorado, Illinois, Iowa, Kansas, Louisiana, Minnesota, Mississippi, New Jersey, New Mexico, North Carolina, Ohio, Oregon, South Carolina, Virginia and Washington State Employment Services

U. S. DEPARTMENT OF LABOR
John T. Dunlop, Secretary

Employment and Training Administration
William H. Kolberg
Assistant Secretary of Labor
for
Employment and Training

1975

Development of USES Specific Aptitude Test Battery S-217R75

For

Proof-Machine Operator (banking) 217.388

RESEARCH SUMMARY

This report describes the research which resulted in the development of the following Specific Aptitude Test Battery for use in selecting inexperienced or untrained individuals for training as Proof-Machine Operators:

Aptitudes	Cutting Scores
N - Numerical Aptitude	70
Q - Clerical Perception	115
K - Motor Coordination	95

Sample:
Two hundred forty-three Proof-Machine Operators (216 females and 27 males) employed in banks in the North, South and West (see Appendix 2). A total of 116 were minority group members (61 Blacks, 2 French Canadians, 2 American Indians, 1 Indonesian, 1 Filipino, 24 Orientals, 23 Spanish Surnamed, and 2 unidentified) and 127 were nonminority group members.

Criterion:
Supervisory ratings. Criterion data were collected during 1973, 1974 and 1975.

Design:
Concurrent. Test and criterion data were collected at about the same time.

Validity:
Phi coefficient for total sample = .22 ($P/2 < .0005$)
Phi coefficient for Black subsample = .25 ($P/2 < .025$)
Phi coefficient for nonminority subsample = .23 ($P/2 < .01$)

Comparison of Minority and Nonminority Groups:
No differential validity was found for this battery. The difference between the phi coefficients for Black and nonminority groups for the validation sample is not statistically significant (CR = .19). The battery is fair to Blacks since the percent of Blacks who met the cutting scores approximated the percent who were in the high criterion group; 46% of the Blacks met the cutting scores and 54% were in the high criterion group.

JOB ANALYSIS

A job analysis was performed by observation of the workers' performance on the job and in consultation with the Operators' supervisors. On the basis of the job analysis, the job description shown in Appendix 4 was prepared, which was used to (1) select an experimental sample of Operators who were performing the job duties; (2) choose an appropriate criterion or measure of job performance; (3) determine which aptitudes are critical, important or irrelevant to job performance (see Tables 1 and 4); and (4) provide information on the applicability of the test battery resulting from this research.

TABLE 1

Qualitative Analysis

Aptitude	Rationale
G - General Learning Ability	Required to learn operation of machine and correct discrepancies between proof machine and teller totals.
N - Numerical Aptitude	Required to balance tapes, locate, correct, record errors and to enter totals on settlement sheets.
Q - Clerical Perception	Required to perceive accurately and quickly check amounts and codes and to be able to locate, correct and record errors.
K - Motor Coordination	Required to read numbers on checks and record by hand numbers on keyboard of proof machine.
F - Finger Dexterity	Required to handle check and operating proof machine rapidly and accurately.

EXPERIMENTAL TEST BATTERY

All 12 tests of the GATB, B-1002B, were administered.

CRITERION

The immediate supervisor rated each worker. The ratings were obtained by means of personal visits of State test development analysts who explained the rating procedure to the supervisors. Two ratings were obtained from each supervisor with an interval of at least two weeks between the ratings. Since sample members' test scores are confidential, supervisors had no knowledge of the scores of the workers.

A descriptive rating scale was used. The scale (see Appendix 3) consists of six items. Five of these items cover different aspects of job performance. The sixth item is a global item on the Proof Operator's "all-around" ability. Each item has five alternative responses corresponding to different degrees of job proficiency. For the purpose of scoring the items, weights of 1 to 5 were assigned to the responses. The total score on the rating scale is the sum of the weights for the six items. The possible range for each rating is 6 - 30.

A review of the job description indicated that the subjects covered by the rating scale were directly related to important aspects of job performance.

A - Amount of work: Proof Operators must work quickly and efficiently in order to sort and record many bank transactions.

B - Quality of work: Proof Operators' work must meet the high quality standards established by the bank.

C - Accuracy of work: Proof Operators must avoid making mistakes in the many financial transactions that are handled.

D - Amount of knowledge: Proof Operators must have sufficient knowledge of procedures and policies to perform the job adequately.

E - Variety of job duties: Proof Operators must be able to perform many different transactions such as preparing incoming cash letters, processing bank credit charge forms, doing miscellaneous balancing and acting as Teller by handling mail deposits and acknowledging receipt of each deposit.

F - "All-around" ability: Proof Operators' value to employer involves a combination of the aspects of job performance listed above.

A reliability coefficient of .85 was obtained between the initial ratings and the re-ratings, indicating a significant relationship. Therefore, the final criterion score consists of the combined scores of the two ratings. The possible range for the final criterion is 12 - 60. The actual range is 18-60. The mean is 43.4 with a standard deviation of 8.7. The relationship between the criterion and age, education and experience is shown in Table 2.

TABLE 2

Means, Standard Deviations (SD) and Pearson Product-Moment Correlations with the Criterion (r) for Age, Education and Experience

	Mean	SD	r
Age (years)	25.3	7.7	.07
Education (years)	12.7	1.2	.02
Total Experience (months)	32.4	41.9	.27**

**Significant at the .01 level

About one-third of the workers are considered to be marginal workers. Therefore, the criterion distribution was dichotomized so as to include about one-third of the sample in the low criterion group and the remainder in the high criterion group. The criterion cutting score was set at 41 which places 38% in the low criterion group and 62% in the high criterion group. It was not possible to place precisely one-third of the workers in the low criterion group because of the nature of the criterion distribution.

SAMPLE

The validation sample consisted of 243 Proof-Machine Operators (216 females and 27 males) employed in banks in the North, South and West (see Appendix 2). A total of 116 were minority group members (61 Blacks, 2 French Canadians, 2 American Indians, 1 Indonesian, 1 Filipino, 24 Orientals, 23 Spanish Surnamed, and 2 unidentified) and 127 were nonminority group members. The means and standard deviations for age, education and experience of sample members are shown in Table 2. Descriptive statistics for subgroups are shown in Appendix 1.

STATISTICAL RESULTS

TABLE 3
Statistical Results for Validation Sample
N=243

Aptitude	Mean	SD	r
G - General Learning Ability	97.9	17.3	.27**
V - Verbal Aptitude	99.7	15.6	.25**
N - Numerical Aptitude	99.5	17.2	.29**
S - Spatial Aptitude	98.1	19.7	.13*
P - Form Perception	119.5	18.4	.24**
Q - Clerical Perception	124.6	18.8	.21**
K - Motor Coordination	114.2	15.0	.08
F - Finger Dexterity	104.3	20.8	.07
M - Manual Dexterity	103.5	21.9	.02

* Significant at the .05 level
** Significant at the .01 level

Table 4 summarizes the qualitative analysis and statistical results shown in Tables 1 and 3 and shows the aptitudes considered for inclusion in the battery.

TABLE 4

Summary of Qualitative and Quantitative Data for Validation Sample

	Aptitudes								
Type of Evidence	G	V	N	S	P	Q	K	F	M
"Critical" on Basis of Job Analysis									
"Important" on Basis of Job Analysis	X		X			X	X	X	
"Irrelevant" on Basis of Job Analysis									
Relatively High Mean					X	X	X		
Relatively Low Standard Deviation									
Significant Correlation with Criterion	X	X	X	X	X	X			
Aptitudes Considered for Inclusion in the Battery	G	V	N	S	P	Q	K		

The information in Table 4 indicates that the following aptitudes should be considered for inclusion in the battery: G, V, N, S, P, Q and K. The objective is to develop a battery of 2, 3, or 4 aptitudes with cutting scores set at the point (a) where about the same percent will meet the cutting scores as the percent placed in the high criterion group and (b) which will maximize the relationship between the battery and the criterion. The cutting scores are set at approximately one standard deviation below the mean aptitude scores of the sample, with deviations at five point intervals above or below these points to achieve the objectives indicated above.

The following battery resulted:

Aptitudes	Cutting Scores
N - Numerical Aptitude	70
Q - Clerical Perception	115
K - Motor Coordination	95

VALIDITY OF THE BATTERY

TABLE 5
Validity of Battery for Total Sample

	Below Cutting Scores	Meeting Cutting Scores	Total
High Criterion Group	43	107	150
Low Criterion Group	47	46	93
Total	90	153	243

Phi coefficient = .22
Significance level = P/2 < .0005

TABLE 5a
Validity of Battery for Black Subsample

	Below Cutting Scores	Meeting Cutting Scores	Total
High Criterion Group	14	19	33
Low Criterion Group	19	9	28
Total	33	28	61

Phi coefficient = .25
Significance level = P/2 < .025

TABLE 5b
Validity of Battery for Nonminority Subsample

	Below Cutting Scores	Meeting Cutting Scores	Total
High Criterion Group	22	62	84
Low Criterion Group	21	22	43
Total	43	84	127

Phi coefficient = .23
Significance level = $P/2 < .01$

OCCUPATIONAL APTITUDE PATTERN

This occupation was incorporated into OAP-33 in Section II of the 1970 edition of the Manual for the USES General Aptitude Test Battery with a "double asterisk" (**), because the aptitudes included in this battery differ from those in OAP-33 but a significant phi coefficient was obtained between the criterion and OAP-33 cutting scores of N-95, P-100 and Q-105. A phi coefficient of .15 ($P/2 < .01$) was obtained for this sample.

APPENDIX 1

Descriptive Statistics for Black and Nonminority Subgroups of Validation Sample

	Black (N=61)			Nonminority (N=127)		
Variable	Mean	SD	Range	Mean	SD	Range
Aptitude G	87.0	14.2	60-133	101.4	15.6	64-149
Aptitude V	90.9	11.8	72-127	103.4	15.3	76-156
Aptitude N	90.3	13.9	63-129	102.1	16.6	55-159
Aptitude S	87.6	15.2	61-124	100.9	19.3	14-150
Aptitude P	111.4	16.3	84-147	122.9	18.4	85-170
Aptitude Q	120.8	20.8	75-178	126.9	17.2	88-217
Aptitude K	114.9	13.6	82-151	110.5	14.4	76-155
Aptitude F	96.3	21.4	54-143	104.7	19.5	53-154
Aptitude M	95.3	20.7	46-145	103.4	21.5	53-165
Criterion	41.2	9.7	18-60	44.3	8.6	20-60
Age	23.0	4.3	17-37	26.0	8.8	17-56
Education	12.8	1.1	12-16	12.4	1.1	8-15
Total Experience (months)	23.6	23.1	4-96	36.8	50.5	4-348

APPENDIX 2

Organizations Cooperating in the Study

North
Hyde Park Bank and Trust Company, Chicago, Illinois
Exchange National Bank, Chicago, Illinois
Security National Bank, Sioux City, Iowa
First National Bank, Wichita, Kansas
Fourth National Bank, Wichita, Kansas
Kansas State Bank and Trust Company, Wichita, Kansas
First National Bank of Minneapolis, Minneapolis, Minnesota
Northwestern National Bank of Minneapolis, Minneapolis, Minnesota
National Bank of New Jersey, New Brunswick, New Jersey
Fifth-Third Bank, Cincinnati, Ohio
National City Bank, Cleveland, Ohio

South
Union National Bank, Little Rock, Arkansas
Ouachita National Bank, Monroe, Louisiana
Deposit Guaranty National Bank, Jackson, Mississippi
First National Bank, Jackson, Mississippi
Wachovia Bank and Trust Company, Raleigh, North Carolina
North Carolina National Bank, Raleigh, North Carolina
Bankers Trust, Columbia, South Carolina
C and S National Bank of South Carolina, Columbia, South Carolina
United Virginia Bankshares, Richmond, Virginia
Fidelity National Bank, Lynchburg, Virginia
Bank of Virginia Company, Richmond, Virginia

West
Valley National Bank, Phoenix, Arizona
Sumitomo Bank of California, Los Angeles and San Francisco, California
Wells Fargo Bank, San Francisco, California
United California Bank, Los Angeles and San Francisco, California
Bank of Tokyo of California, Los Angeles and San Francisco, California
Federal Reserve Bank of San Francisco, Los Angeles Branch, Los Angeles, California
Crocker National Bank, Los Angeles California
Citadel Bank, Colorado Springs, Colorado
Bank of Denver, Denver, Colorado
Central Bank and Trust Company, Denver Colorado
First National Bank, Fort Collins, Colorado
United Bank of Fort Collins, Fort Collins, Colorado
First National Bank, Albuquerque, New Mexico

Bank of New Mexico, Albuquerque, New Mexico
American Bank of Commerce, Albuquerque, New Mexico
First National Bank of Oregon, Portland, Oregon
Peoples National Bank, Seattle, Washington

APPENDIX 3

U.S. DEPARTMENT OF LABOR • MANPOWER ADMINISTRATION

DESCRIPTIVE RATING SCALE

For

SCORE _____

VALIDATION SAMPLE

RATING SCALE FOR _____

D.O.T. Title and Code

Directions: Please read the "Suggestions to Raters" and then fill in the items which follow. In making your ratings, only one box should be checked for each question.

SUGGESTIONS TO RATERS

We are asking you to rate the job performance of the people who work for you. These ratings will serve as a "yardstick" against which we can compare the test scores in this study. The ratings must give a true picture of each worker or this study will have very little value. You should try to give the most accurate ratings possible for each worker.

These ratings are strictly confidential and won't affect your workers in any way. Neither the ratings nor test scores of any workers will be shown to anybody in your company. We are interested only in "testing the tests." Ratings are needed only for those workers who are in the test study.

Workers who have not completed their training period, or who have not been on the job or under your supervision long enough for you to know how well they can perform this work should not be rated. Please inform the test technician about this if you are asked to rate any such workers.

Complete the last question only if the worker is no longer on the job.

In making ratings, don't let general impressions or some outstanding trait affect your judgment. Try to forget your personal feelings about the worker. Rate only on the work performed. Here are some more points which might help you:

1. Please read all directions and the rating scale thoroughly before rating.

2. For each question compare your workers with "workers-in-general" in this job. That is, compare your workers with other workers on this job that you have known. This is very important in small plants where there are only a few workers. We want the ratings to be based on the same standard in all the plants.

3. A suggested method is to rate all workers on one question at a time. The questions ask about different abilities of the workers. A worker may be good in one ability and poor in another: for example, a very slow worker may be accurate. So rate all workers on the first question, then rate all workers on the second question, and so on.

4. Practice and experience usually improve a worker's skill. However, one worker with six months' experience may be a better worker than another with six years' experience. Don't rate one worker as poorer than another merely because of a lesser amount of experience.

5. Rate the workers according to the work they have done over a period of several weeks or months. Don't rate just on the basis of one "good" day, or one "bad" day or some single incident. Think in terms of each worker's usual or typical performance.

6. Rate only the abilities listed on the rating sheet. Do not let factors such as cooperativeness, ability to get along with others, promptness and honesty influence your ratings. Although these aspects of a worker are important, they are of no value for this study as a "yardstick" against which to compare aptitude test scores.

NAME OF WORKER (Print) (Last) (First)

SEX: MALE_____ FEMALE_____

Company Job Title: _____

How often do you see this worker in a work situation?

- ☐ All the time.
- ☐ Several times a day.
- ☐ Several times a week.
- ☐ Seldom.

How long have you worked with this worker?

- ☐ Under one month.
- ☐ One to two months.
- ☐ Three to five months.
- ☐ Six months or more.

A. How much can this worker get done? (Worker's ability to make efficient use of time and to work at high speed.) (If it is possible to rate only the quantity of work which a person can do on this job as adequate or inadequate, use #2 to indicate "inadequate" and #4 to indicate "adequate.")

- ☐ 1. Capable of very low work output. Can perform only at an unsatisfactory pace.
- ☐ 2. Capable of low work output. Can perform at a slow pace.
- ☐ 3. Capable of fair work output. Can perform at an acceptable pace.
- ☐ 4. Capable of high work output. Can perform at a fast pace.
- ☐ 5. Capable of very high work output. Can perform at an unusually fast pace.

B. How good is the quality of work? (Worker's ability to do high-grade work which meets quality standards.)

- ☐ 1. Performance is inferior and almost never meets minimum quality standards.
- ☐ 2. Performance is usually acceptable but somewhat inferior in quality.
- ☐ 3. Performance is acceptable but usually not superior in quality.
- ☐ 4. Performance is usually superior in quality.
- ☐ 5. Performance is almost always of the highest quality.

C. How accurate is the work? (Worker's ability to avoid making mistakes.)

- ☐ 1. Makes very many mistakes. Work needs constant checking.
- ☐ 2. Makes frequent mistakes. Work needs more checking than is desirable.
- ☐ 3. Makes mistakes occasionally. Work needs only normal checking.
- ☐ 4. Makes few mistakes. Work seldom needs checking.
- ☐ 5. Rarely makes a mistake. Work almost never needs checking.

D. How much does the worker know about the job? (Worker's understanding of the principles, equipme materials and methods that have to do directly or indirectly with the work.)

☐ 1. Has very limited knowledge. Does not know enough to do the job adequately.

☐ 2. Has little knowledge. Knows enough to get by.

☐ 3. Has moderate amount of knowledge. Knows enough to do fair work.

☐ 4. Has broad knowledge. Knows enough to do good work.

☐ 5. Has complete knowledge. Knows the job thoroughly.

E. How large a variety of job duties can the worker perform efficiently? (Worker's ability to handle several different operations.)

☐ 1. Cannot perform different operations adequately.

☐ 2. Can perform a limited number of different operations efficiently.

☐ 3. Can perform several different operations with reasonable efficiency.

☐ 4. Can perform many different operations efficiently.

☐ 5. Can perform an unusually large variety of different operations efficiently.

F. Considering all the factors already rated, and only these factors, how good is this worker? (Worker's all-around ability to do the job.)

☐ 1. Performance usually not acceptable.

☐ 2. Performance somewhat inferior.

☐ 3. A fairly proficient worker.

☐ 4. Performance usually superior.

☐ 5. An unusually competent worker.

Complete the following ONLY if the worker is no longer on the job.

G. What do you think is the reason this person left the job? (It is not necessary to show the official reason if you feel that there is another reason, as this form will not be shown to anybody in the company.)

☐ 1. Fired because of inability to do the job.

☐ 2. Quit, and I feel that it was because of difficulty doing the job.

☐ 3. Fired or laid off for reasons other than ability to do the job (i.e., absenteeism, reduction in force).

☐ 4. Quit, and I feel the reason for quitting was not related to ability to do the job.

☐ 5. Quit or was promoted or reassigned because the worker had learned the job well and wanted to advance.

RATED BY	TITLE	DATE
COMPANY OR ORGANIZATION	LOCATION (City, State, ZIP Code)	

APPENDIX 4

Proof-Machine Operator (banking) 217.388

S-217R76

JOB DUTIES

Sorts, records, and proves records of bank transactions such as checks, deposit slips, and withdrawal slips using full or 10-key proof machine. Prepares outgoing cash letters for mailing. Performs other related clerical duties as required.

*Operates proof machine to sort and record bank transactions: Clears machine and checks tape supply. Stacks batches of banking transactions for feeding into mechanism of proof machine. Reads bank name or designated code number and dollar amount on the face of each transaction. Feeds items into machine to be endorsed, encoded, recorded, and grouped by machine. Visually locates and depresses keys of proof machine to imprint values, to sort items into various categories, and to record items and dollar amounts simultaneously on master control tape and individual batch tapes. Observes panel lights to detect pockets containing missorted transactions. Manually removes missorted items from pockets and sorts into correct pockets. Observes operation of proof machine to detect malfunctioning. Reports major malfunctions to supervisor. Empties machine compartments when the light on the proof machine indicates the necessity of doing so and binds each batch of transactions with a rubber band.

*Proves records of bank transactions: Totals tapes and locates, corrects and records errors. Attaches tapes to sorted batches and prepares recapitulation sheets.

Prepares outgoing cash letters: Prepares and places copies of cash letter form with bank transactions in envelopes for mailing.

Performs other related clerical duties as required: Microfilms all items and proof machine tapes after each packet has been totaled. Prepares incoming cash letters. Processes bank credit charges by typing appropriate information from credit charge forms and doing miscellaneous balancing. Acts as Teller by handling mail deposits and acknowledging receipt of each deposit.

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*These duties were designated as critical because they must be done competently if the job is to be performed in a satisfactory manner. Proof-Machine Operators spend about 95% of their working time performing these duties.

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